It is therefore an object of this invention to provide a sample processing method and apparatus which goes at least some way to avoiding any one or more of the abovementioned problems or disadvantages, or at least provides a useful alternative.

## STATEMENTS OF INVENTION

In one aspect of the invention there is provided a method for producing a sample for processing or analysis including the following steps:

a) introducing a sample into a mixing chamber containing a suspension fluid, where the sample is either in solid form or is in liquid form immiscible with the suspension fluid, so that the sample is a discrete sample immersed in the suspension fluid, and where the sample moves from an inlet to an outlet of the mixing chamber; and

b) introducing one or more reagents into the mixing chamber, where the one or more reagents are either in solid form or are in liquid form immiscible with the suspension fluid, so that each of the reagents is a discrete reagent immersed in the suspension fluid, and where each of the reagents moves from the inlet and contacts the sample at a location in the mixing chamber before the sample reaches the outlet of the mixing chamber;

where the location of contact between the sample and the one or more reagents in the mixing chamber is predetermined by predetermining the rate of movement of the sample and of each reagent within the suspension fluid, and where the sample mixes with the one or more reagents upon contact to form a processed sample for further processing or analysis.

In a preferred embodiment of the invention, the rate of movement of the sample and of each reagent in the suspension fluid of known density is predetermined by selecting the size and density of the sample and/or the size and density of each reagent.

Preferably, the rate of movement of the sample and the rates of movement of each reagent are such that the sample contacts and mixes with each reagent as it moves in the mixing chamber.

Preferably, the mixing chamber has a tapered portion to assist contact of the sample with each reagent by causing the sample and each reagent to converge as they move in the mixing chamber.

In one preferred embodiment of the invention, the sample contacts and mixes with a single reagent as it moves in the mixing chamber. In an alternative preferred embodiment, the sample contacts and mixes with two or more reagents in the mixing chamber. Preferably the two or more reagents contact and mix with the sample at substantially the same time. Alternatively, the rates of movement of the sample and of each of the two reagents are predetermined so that the sample contacts and mixes with a first reagent and then contacts and mixes with a second reagent, and optionally with further reagents successively.

In a preferred embodiment of the invention, the mixing chamber is orientated vertically. The sample and the one or more reagents may be introduced at or near to the top of the mixing chamber and descend in the suspension fluid. Alternatively, the sample and the one or more reagents may be introduced at or near to the bottom of the mixing chamber and ascend in the suspension fluid.

The sample may be any sample suitable for the method of the invention, but is preferably an extract from a biological sample selected from the group including, but not limited to, blood, serum, semen, saliva, urine, milk, and an extract obtained from meat, fat, bone, hair, skin, faeces, plant material or microbial habitats, or is preferably a non-biological sample selected from the group including, but not limited to, water from waterways, industrial wastes, and hazardous or non-hazardous chemicals, including radioactive materials.

## CLAIMS

1. A method for producing a sample for processing or analysis including the following steps:

   a) introducing a sample into a mixing chamber containing a suspension fluid, where the sample is either in solid form or is in liquid form immiscible with the suspension fluid, so that the sample is a discrete sample immersed in the suspension fluid, and where the sample moves from an inlet to an outlet of the mixing chamber; and

   b) introducing one or more reagents into the mixing chamber, where the one or more reagents are either in solid form or are in liquid form immiscible with the suspension fluid, so that each of the reagents is a discrete reagent immersed in the suspension fluid, and where each of the reagents moves from the inlet and contacts the sample at a location in the mixing chamber before the sample reaches the outlet of the mixing chamber;

   where the location of contact between the sample and the one or more reagents in the mixing chamber is predetermined by predetermining the rate of movement of the sample and of each reagent within the suspension fluid, and where the sample mixes with the one or more reagents upon contact to form a processed sample for further processing or analysis.

2. A method as claimed in claim 1 where the rate of movement of the sample and of each reagent in the suspension fluid of known density is predetermined by selecting the size and density of the sample and/or the size and density of each reagent.

3. A method as claimed in claim 1 or claim 2 where the rate of movement of the sample and the rates of movement of each reagent are such that the sample contacts and mixes with each reagent as it moves in the mixing chamber.

4. A method as claimed in any one of claims 1 to 3 where the mixing chamber has a tapered portion to assist contact of the sample with each reagent by causing the sample and each reagent to converge as they move in the mixing chamber.

5. A method as claimed in any one of claims 1 to 4 where the sample contacts and mixes with a single reagent in the mixing chamber.

6. A method as claimed in any one of claims 1 to 5 where the sample contacts and mixes with two or more reagents in the mixing chamber.

7. A method as claimed in claim 6 where the two or more reagents contact and mix with the sample at substantially the same time.

8. A method as claimed in claim 6 where the rates of movement of the sample and of each of the two reagents are predetermined so that the sample contacts and mixes with a first reagent and then contacts and mixes with a second reagent, and optionally with further reagents successively.

9. A method as claimed in any one of claims 1 to 8 where the mixing chamber is orientated vertically.

10. A method as claimed in claim 9 where the sample and the one or more reagents are introduced at or near to the top of the mixing chamber and descend in the suspension fluid.

11. A method as claimed in claim 9 where the sample and the one or more reagents are introduced at or near to the bottom of the mixing chamber and ascend in the suspension fluid.